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*O. biennis* and *O. muricata*, however, the only exception seems to be in the size and form of the petals.

The very interesting discovery was made by J. M. Geerts<sup>4</sup> that approximately half the ovules and half the pollen grains of the allogametic species of *Oenothera* are abortive. It is suggested that in case of *Oenothera biennis* only those ovules that carry the *conica* form develop, those that should carry the *biennis* form aborting. On the other hand only those pollen grains which carry the *biennis* form mature, those that should carry the *conica* form failing to develop.

WALTER T. SWINGLE

#### STUDIES IN ARTERIOSCLEROSIS

MUCH has appeared in the literature in recent years upon the etiology and process of development of arteriosclerosis. Many observations have been made upon the human subject and also in experimental animals, of points co-relating certain factors with the production of disease in the arterial tree. In most instances these factors have been carefully studied by competent observers and in many instances the results have been verified by others.

The gathering of facts concerning arteriosclerosis is quite simple—the interpretation of these involves much difficulty. In carrying out any experiment or in offering reasons for a given result, we are constantly reminded of the manifold factors which enter a given experiment or which are naturally present. Often our experiment on animals only induces altered conditions which indirectly bring about the result we are seeking. That the greatest care must be exercised in drawing inferences from animal experimentation is well illustrated in studies upon arteriosclerosis.

Recently Levin and Larkin<sup>1</sup> have published the results of their experiments on dogs, in

which by producing an arterio-venous anastomosis between the external jugular vein and the external carotid artery, they arrive at the sweeping conclusion that “arteriosclerosis can not be artificially induced in a previously healthy blood-vessel by a change in the blood pressure alone.” To *this type* of conclusion we must take exception.

Levin and Larkin, experimenting on ten dogs, joined the external carotid artery to the external jugular vein. In two of these dogs thrombosis occurred close to the line of suture in the vessels. All but two of the remaining eight animals received injections of adrenalin at varying periods. These eight dogs, which form the positive results and from which the above positive statement respecting arteriosclerosis was made, were allowed to live 102, 38, 72, 15, 124 and 58 and 44 days, respectively.

No one, who has studied diverse pathological lesions, will deny that the distribution of various lesions in organs is not uniform in the animal world. Man is particularly subject to lesions of the circulatory system—a condition not so frequent in lower animals. Rabbits and horses occasionally suffer from arterial lesions—more often seen in the older animals and in certain breeds. Dogs and cats rarely develop lesions in the arteries, even under the most trying circumstances.

This varying susceptibility still awaits an explanation, but in the face of our ignorance in the matter, we must assume the greatest care in drawing broad conclusions or in proposing far reaching principles. Negative experimental results for the dog have no positive bearing upon experimental facts observed in other animals.

Much criticism is offered against the use of the rabbit for experiments upon the circulatory system. The comment has been that spontaneous arterial disease occurs in this animal. And yet none of the critics offer any suggestion for the cause of this spontaneous lesion! Properly selected animals and controlled experiments can reduce the error of “spontaneous” disease to almost a vanishing point. The very feature, in the rabbit, of readily reacting in its arterial tree to different

<sup>4</sup> Geerts, J. M., “Beiträge zur Cytologie und der partiellen Sterilibät von *Oenothera Lamarkiana*,” in *Recueil des travaux botaniques néerlandais*, 5: 93–208, pl. 5–22 (N. 2–4, June, 1909), also published as a separate article.

<sup>1</sup> *Jour. Exper. Med.*, 1911, XIII., p. 24.

noxæ, determines its usefulness for studying the diseases of the circulation.

In the experiments of the above-cited authors, the observations were made upon the venous segments of the anastomosis. Here although in only some of the animals the vein was noted to be dilated, it is concluded that an increased blood pressure existed in all. It is not at all clear to what extent the blood pressure was increased when the external carotid and external jugular were united. With the free anastomosis which exists (varying much in individual animals), between the venous channels of the neck, it is possible that an increase of pressure exists for only a short period after the successful anastomosis.<sup>2</sup>

It is further to be pointed out that various observers have recorded that periodic and intermittently increased blood pressures have quite a different effect upon the blood vessels than a constant and continuous one. The periodically increased pressure is found commonly in man, and if we may draw any conclusions from the finding of occupation sclerosis (right radial sclerosis in the blacksmith, femoral sclerosis in the policeman), it is that the periodic increase of pressure leads to degenerations and sclerosis in the arteries.

Finally, but of primary importance, the results of observations on veins can not be utilized in drawing conclusions about arteries, as has been done by Levin and Larkin.

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#### PRESENCE OF ARSENIC IN FRUIT SPRAYED WITH ARSENATE OF LEAD

THE spraying of fruits with an arsenical has been practised for a number of years in the control of insects which destroy by eating. The form in which arsenic was first used was Paris green, which, however, proved, for the most part, to be more or less injurious to foliage and fruit on account of the soluble character of the compound. Only within re-

cent years has arsenate of lead come into use. The main reasons for its use as recommended by entomologists was its greater purity and insolubility in water. During the past three years the writer has had occasion to question the use of arsenate of lead as commonly found on the market. Many brands do not show sufficient uniformity in arsenic content, nor is the arsenic found in the proper combination with the lead. When lead nitrate and disodium arsenate or lead acetate and disodium arsenate are combined at least three forms of arsenate of lead may result, namely, ortho-arsenate of lead ( $\text{Pb}_3(\text{AsO}_4)_2$ ), pyro-arsenate of lead ( $\text{Pb}_2\text{As}_2\text{O}_7$ ) and meta-arsenate of lead ( $(\text{PbHAsO}_4)_2$ ). The last named compound is very injurious to foliage and fruit under certain climatic influences; and the pyro-arsenate of lead may become so in the presence of water containing soluble chlorides, sulphates or carbonates. Very few of the waters commonly used to apply arsenate of lead are pure, hence injury may result, although the compound if used with chemically pure water will produce no injury. The ortho-arsenate of lead, however, is practically insoluble in neutral and alkaline solvents.

Besides any apparent injury, such as the spotting or burning of the fruit and foliage, a certain amount of arsenic may be absorbed by the fruit without showing any injury at the time. The occurrence of certain spots on apples held in storage has occupied the attention of the writer for some time. Upon examination, such fruits were found to contain appreciable quantities of arsenic. The badly red-spotted and black-spotted fruits showed approximately twice as much arsenic as fruits from the same lot which showed no spotting. A ten-gram sample of badly spotted apple skin showed 0.05 of a milligram of metallic arsenic. One large Spitzenburg apple showed a total of 0.3 milligram of arsenic calculated as  $\text{As}_2\text{O}_5$ . The fruits were carefully washed so as to exclude from analysis all arsenic that adhered to the surface.

It has also been noted by the writer that certain papers used to wrap apples and pears, a practise common on the Pacific coast, con-

<sup>2</sup>See Carrel and Guthrie, "Surg. Gynec. and Obstet.," 1906, Vol. II.; and Watts, *Bull. Johns Hopkins Hosp.*, 1907, Vol. XVIII.